

Glossary¹

Acid Plant Blowdown: Waters that have been used in an acid plant and that have accumulated contaminants to such an extent that they are removed from the system.

Acute Exposure: Exposure to a substance for a short period of time.

Adsorption Coefficient (K_d): A measure of the degree to which constituents bind to a material (e.g., the soil).

Aggregate: A rock material such as sand, gravel, or crushed rock with which cement or bitumen is mixed to form a mortar or concrete.

Alkaline: A synonym for basic (i.e., pH greater than 7).

Alumina: Aluminum oxide, Al_2O_3 , an important constituent of all clays, determining their suitability for firebrick and furnace linings; also, used in granular form for abrasive purposes.

Amalgamation: The process by which mercury is alloyed with some other metal to produce an amalgam.

Ambient: The area surrounding the facility or residual management unit. "Ambient" monitoring data refers to pollutant measurement data from the medium (e.g., air, surface water) to which the pollutants are discharged, not to measurements of the discharge itself.

Anhydrous: Minerals which do not contain water in chemical combination.

Anode: The positive electrode in an electrolytic cell.

Anode Copper: Special-shaped copper slabs, resulting from the refinement of blister copper in a furnace, used as anodes in electrolytic refinement.

Anode Metals: Metals (e.g., copper) used for electroplating. They are as pure as commercially possible, uniform in texture and composition, and have the skin removed by machining.

Aquifer: A subsurface formation containing water in quantities sufficient to be withdrawn.

Baghouse: Chamber in which exit gases (e.g., from roasting, smelting, and calcining) are filtered through membranes (bags) which arrest solids.

Bauxite: A mineral composed of one or more aluminum hydroxides (e.g., boehmite, gibbsite, and diaspore) and impurities such as silica, clay, silt, and iron hydroxide; essentially, $Al_2O_3 \cdot 2H_2O$. A clay containing much bauxite should be termed bauxite.

¹ Many of the glossary definitions are taken from the Dictionary of Mining, Mineral, and Relating Terms, compiled and edited by P.W. Thrush and Staff of the Bureau of Mines, U.S. Dept. of the Interior, Bureau of Mines, 1968.

Beneficiation: The following activities: crushing, grinding, washing, dissolution, crystallization, filtration, sorting, sizing, drying, sintering, pelletizing, briquetting, calcining to remove water and/or carbon dioxide, roasting in preparation for leaching, gravity concentration, magnetic separation, electrostatic separation, flotation, ion exchange, solvent extraction, electrowinning, precipitation, amalgamation, and heap, dump, vat, tank, and in situ leaching.

Bleed Electrolyte: Electrolyte from electrolytic metal refining that has accumulated contaminants to such an extent that it must be removed from the system.

Blister Copper: An impure (98.5 - 99.5 percent) intermediate product in the refining of copper, produced by blowing copper matte in a converter, the name being derived from the large blisters on the cast surface that result from the liberation of SO₂ and other gases.

Brine: Water with a high (e.g., greater than sea water) salt concentration.

Briquetting: A process by which coke breeze, coal dust, iron ore, or other pulverized mineral commodities is bound together into briquettes, under pressure, with or without a binding agent such as asphalt.

By-Product Manufacturing Unit: A management unit that receives a residual as a feedstock and produces a saleable product or intermediate product.

Calcination: Heating an ore or mineral product or intermediate product in a furnace or kiln to decompose carbonates, hydrates, or other compounds to produce a final product. The process is different from roasting in that air is not supplied to the charge during heating.

Cancer Risk: The estimated probability of occurrence of cancer in an individual, over that individual's lifetime.

Capacity: The maximal annual output of a particular processing operation, irrespective of market conditions. This limit may be determined by either design constraints or permit limitations.

Carcinogen: A chemical for which there is sufficient evidence that it can cause cancer in humans.

Cathode: The negative electrode in an electrolytic cell.

Cementitious: Having the property of or acting like cement (see Pozzolanic) (e.g., certain limestones and tuffs when used in the surfacing of roads).

Chemical Conversion: A mineral processing operation in which an ore or mineral or beneficiated ore or mineral is treated with one or more chemicals in order to initiate a reaction that liberates and/or changes the chemical form of the ore value(s). Examples include sulfuric acid digestion of phosphate ore and of titanium ore.

Chronic Exposure: Exposure to a substance over a long period of time.

Closure Plan: A written plan that identifies and describes the steps that will be carried out to close, dismantle, decommission, and/or reclaim a residuals management unit at a mineral processing facility.

Constituent: A chemical or radiological agent (e.g., arsenic or radium-226) present in a waste.

Corrosivity: One of the four characteristics of hazardous waste as defined by EPA, based upon pH values of less than 2.0 or greater than 12.5 (see 40 CFR §261.22).

Crushing: Reducing ore by stamps, crushers, or rolls.

Cryolite: A halide mineral, Na_3AlF_6 , used in the reduction of aluminum ore.

Crystallization: The process through which crystalline phases separate from a fluid.

Cutoff Grade: The lowest grade of mineralized rock that qualifies as ore in a given deposit.

Dewatering: The removal of water from a material by pumping, drainage, filtration, or evaporation.

Dissolution: The process of dissolving or breaking up into a liquid.

Dolomite: A carbonate of calcium and magnesium, $\text{CaMg}(\text{CO}_3)_2$.

Down Gradient: The direction of ground-water flow caused by difference in hydraulic head at two locations (from the highest to the lowest hydraulic head).

Dross: The scum that forms on the surface of molten metals largely because of oxidation but sometimes because of the rising of impurities to the surface.

Drying: The removal of water from ores, concentrates, fluxes, or other materials.

Dump Leaching: A beneficiation operation most often used to extract metal values from subore-grade materials in the copper industry, in which dilute acid or water is percolated through piles of low grade ore or tailings. The dilute metal solution generated is collected at the bottom of the pile (dump), and is subjected to one or more downstream extraction operations to recover the metal values.

Effluent: A liquid, solid, or gaseous product, frequently waste, discharged or emerging from a process.

Electrogalvanizing: The electroplating of zinc upon iron or steel.

Electrolyte: A substance that when dissolved in a suitable solvent or when fused becomes an ionic conductor.

Electrolytic: Pertaining to the use of electrolysis; applied to the refining of metals by deposition from solution.

Electrostatic Separation: A method of separating materials by dropping feed material between two electrodes, positive and negative, rotating in opposite directions. Nonrepelled materials drop in a vertical plane; susceptible materials are deposited in a forward position somewhat removed from the vertical plane.

Electrowinning: The process of refining copper or other metals by the dissolution of the metal bearing ore in an acidic solution, the introduction of the solution as an electrolyte in an electrolytic cell, and the deposition of the metal from solution by application of electric current.

Endangered Species Habitat: The natural surroundings of any plant or animal that is considered endangered or threatened by federal or state governments.

EP Toxicity (Extraction Procedure Toxicity): One of four characteristics of hazardous waste as defined by EPA (see 40 CFR §261.24). Materials that are shown to leach one or more of 14 hazardous constituents at concentrations exceeding 100 times primary drinking water standards are considered EP toxic. These constituents include arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, endrin, lindane, methoxychlor, toxaphene, 2,4-D, and 2,4,5-TP Silvex.

Exposure Pathway: The way a chemical or physical agent comes into contact with humans or the environment.

Extraction: The process of mining and removing ores or minerals from the ground.

Facility: All mining, beneficiation, processing, fabrication/manufacturing, and residuals management units within property boundaries controlled by one operating company.

Fault Area: A geographic region of any size that has been seismically active (i.e., has had displacement or movement) during holocene time (approximately the last 11,000 years).

Ferrosilicon: An alloy of iron and silicon, used in steel and corrosion-resistant cast iron.

Filtration: A process for separating solids from liquids by allowing the liquid to pass through a material which retains the solids.

Floodplain: The portion of a river valley, adjacent to the river channel, that is built of sediments during the present regimen of the stream and which is covered with water when the river overflows its banks at flood stages.

Flotation: See Froth Flotation.

Fluorogypsum: See Gypsum.

Froth Flotation: A floatation process in which the minerals floated gather in and on the surface of bubbles of air or gas driven into or generated in the liquid in some convenient manner.

Fuming: A process whereby fine particles are dispersed in a gaseous phase prior to recovery in condensers; used in the recovery of zinc from the slag generated in lead smelting.

Gravity Concentration: Separating grains of minerals by a concentration method operating by virtue of the differences in density of various mineral; the greater the difference in density between two minerals, the more easily they can be separated.

Grinding: Size reduction into relatively fine particles.

Ground-Water: Water contained within a subsurface formation.

Gypsum: A common evaporite mineral, CaSO_4 , with a variety of uses in construction materials and agriculture. Mined gypsum is generally referred to as natural gypsum, whereas gypsum produced by the neutralization of sulfuric acid from

phosphoric acid or hydrofluoric acid production is referred to as phosphogypsum and fluorogypsum, respectively. Depending on temperature, pH, and the availability of water, gypsum can exist in a variety of forms: anhydrite, CaSO_4 ; hemihydrate, $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$; and dihydrate, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

Gypsum Stack: A residuals management unit that is used to store or dispose of the gypsum produced by acidulation of phosphate rock or feldspar. Active stacks will generally be used for water management as well as gypsum disposal.

Heap Leaching: A beneficiation process in which low grade ore containing valuable metals is piled on an impervious surface (pad) then treated with water or a dilute solution (often containing cyanide). The solution preferentially dissolves metals, such as gold and silver, which are recovered by collecting the solution and extracting the metals.

Hydrolysis: The formation of an acid and a base from a salt by interaction with water.

Hydrometallurgy: Recovery of metals from ores by a liquid process such as leaching with acid, or solvent extraction.

Ignitability: One of the four characteristics of a hazardous waste as defined by EPA (see 40 CFR §261.21), based upon the ability to combust at or near 140 degrees, or to cause fire through friction, or if it is an ignitable compressed gas, or is an oxidizer.

Ilmenite: An iron black mineral, $\text{FeO} \cdot \text{TiO}_2$.

Intermediate: A material produced during the beneficiation or processing of materials, ores, and minerals and which are further processed to recover a usable product or returned to the original process or processes and reused in the production process.

Intrinsic Hazard: The ability of a chemical to harm humans or the environment, if of release and exposure are assumed to occur.

Ion Exchange: The reversible exchange of ions contained in a crystal for different ions in solution without destruction of crystal structure or disturbance of electrical neutrality.

Leachate: A solution formed by dissolving the soluble fraction of a waste or ore into a liquid.

Leaching: The dissolution of chemical constituents from an ore, mineral, beneficiated ore or mineral, or processed ore or mineral by applying water or a solution to the material.

Lignite: A soft brownish-black coal in which the alteration of vegetal material has proceeded further than peat but not so far as subbituminous coal.

Lime: Quicklime (CaO) obtained by calcining limestone or other forms of calcium carbonate.

Liner: A material used in sealing the bottoms of residual management units so as to prevent leakage of contaminants into the environment. Liner materials range from bedrock and in-situ clay to synthetic plastics.

Magnetic Separation: The separation of materials from nonmagnetic materials using a magnet.

Matte: A metallic sulfide mixture made by the smelting of sulfide ores of copper, lead, and nickel.

Maximally Exposed Individual (MEI): An individual designated for each exposure pathway, to be at the greatest risk to constituents released to the environment.

Milling: The process of grinding or crushing ores into fine fractions for removal of valueless or harmful constituents.

Mining: The minerals industry which supplies the community with coal, minerals, or metal raw materials and includes production of primary products, for example, copper from porphyry copper ore.

NESHAP (National Emission Standards for Hazardous Air Pollutants): Air pollutant emission standards for specific contaminants that have been shown to be dangerous to human health.

Oölite: Limestone rock (calcium carbonate) of the Jurassic system consisting of small round grains, resembling fish roe, cemented together.

Overburden: Overlying soil, gravel or rock that is removed in the process of mining.

Pelletizing: A method in which finely divided material is rolled in a drum or on an inclined disk, so that the particles cling together and roll up into small spherical pellets.

Permeability: The capacity of subsurface strata to transmit a fluid, expressed as the rate at which a fluid of standard viscosity (e.g., water) can move a specified distance. Permeability is dependent on the size and shape of pores in the stratum or strata, the size and shape of interconnections between pores, and the extent of these interconnections.

Phosphogypsum: See gypsum.

Pilot Scale: A demonstration or test of a process which is not full-size, but it too large to be done in a laboratory.

Pozzolanic: Able to react with lime in the presence of water at ordinary temperature to produce a cementitious compound.

Precipitation: In mineral processing, the process of separating mineral constituents from a solution by because of lowered solubility, usually caused by lowering the temperature of the solution.

Process Wastewater: Waters used or generated in one or more production operations that have accumulated contaminants to such an extent that they must be removed.

Pyrolysis: The transformation of a compound into another substance through the addition of heat.

Pyrometallurgy: Ore and mineral processing in which feedstocks are subjected to high temperatures in order to separate and remove impurities from the mineral value(s). Examples of pyrometallurgical operations include smelting and roasting.

RCRA (Resource Conservation and Recovery Act): The federal statute (P.L. 94-580, as amended) that provides EPA with the authority to regulate the treatment, accumulation, storage, disposal, and reclamation of solid and hazardous wastes.

Recycling: The return of a mineral processing residual back to the mineral processing operation that generated the material.

Refining: Mineral processing that removes impurities from an ore or mineral, beneficiated ore or mineral, or partially processed (e.g., smelted) ore or mineral.

Residuals: Materials that are generated as a consequence of processing an ore or mineral and that are not the principal product(s) of the operation. Examples include but are not limited to co- and by-products, wastes, feedstocks for further processing operations, and recycled materials. Responses to questions pertaining to specific residuals should focus on the point in the process at which the residual is generated.

Retort: A vessel used for the distillation of volatile materials, as in the separation of some metals and the destructive distillation of coal.

Reverberatory Furnace: A furnace in which heat is radiated from the roof onto the material under treatment; commonly used in the smelting of metals.

Roasting: Heating an ore or mineral or beneficiated ore or mineral with access to air, in order to effect a chemical change (e.g., expulsion of volatile material) without fusing or melting.

Secondary Material: As used in this report, a material, commonly referred to as "scrap material," which is bits and pieces of metal parts (e.g., bars, turnings, rods, sheets, or wires), which when worn or superfluous is used as feedstock in the processing of primary ores and minerals.

Sinter: To heat a mass of fine particles for a prolonged time below the melting point, usually to cause agglomeration.

Sizing: The process of separating mixed particles into groups of particles all of the same size, or into groups in which all particles range between definite maximum and minimum sizes.

Sludge: A soft mud, slush, or mire; for example, the solid product of a filtration process before drying.

Slurry Walls: An type of a containment system that prevents leachate from migrating through ground water systems. Typically, slurry walls are formed in place by excavating a trench outside the edge of a waste management unit or ground-water contaminant plume, mixing the removed native materials with a grout (e.g., bentonite clay, cement, asphalt), and immediately redepositing the slurried mixture in the trench.

Smelter Slag: The nonmetallic top layer consisting primarily of silicates and aluminosilicates of lime or other bases, which separates from the metallic products in the smelting of ores.

Smelting: The chemical reduction of a metal from its ore by a process that usually involves fusion, so that the impurities in the material, separating as lighter and more fusible slags, can be readily removed from the reduced metal, or other thermal processing wherein chemical reactions take place to produce liquid metal from a beneficiated ore.

Solvent Extraction: A method of separating one or more substances from a mixture, by treating a solution of the mixture with a solvent that will dissolve the required substances, leaving the others.

Sorting: The process of selecting one or more portions of some material on the basis of a particular characteristic (e.g., size or density).

Source Reduction: The diminution or elimination of solid and/or hazardous waste at the point of generation, usually within a process.

Speiss: Metallic arsenides and antimonides smelted from cobalt and lead ores.

Tailing(s): The residual arising from the washing, concentration, and/or treatment of ground ores or minerals (beneficiation).

Tailings Pond: A residuals management unit used for disposing tailings. Tailings ponds are typically bounded by a raised earthen embankment.

Titaniferrous: Carrying titanium, as titaniferrous iron ore (see ilmenite).

Treatment: An operation that induces a physical or chemical change in a mineral processing residual.

Vulnerable: A physical setting which facilitates the release and transport of contaminants (e.g., karst terrain), and/or a setting which is especially sensitive to contaminants.

Washing: The process of cleaning, carrying away, or eroding by the buoyant action of flowing water.

Waste Management Unit: Any location at which residuals are treated, stored, accumulated, recovered for reuse, or disposed.

Waste Pile: As used in this report, an above ground accumulation of material which may be temporary or permanent.